

Update on Orbit Feedback

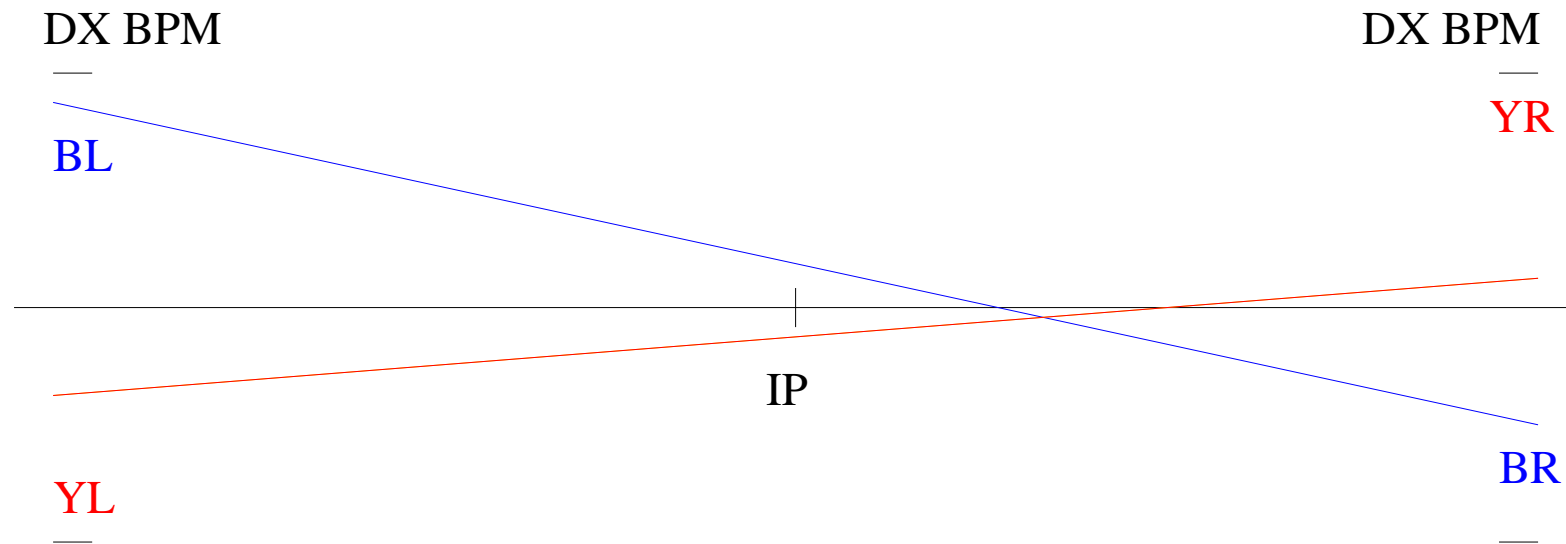
Christoph Montag

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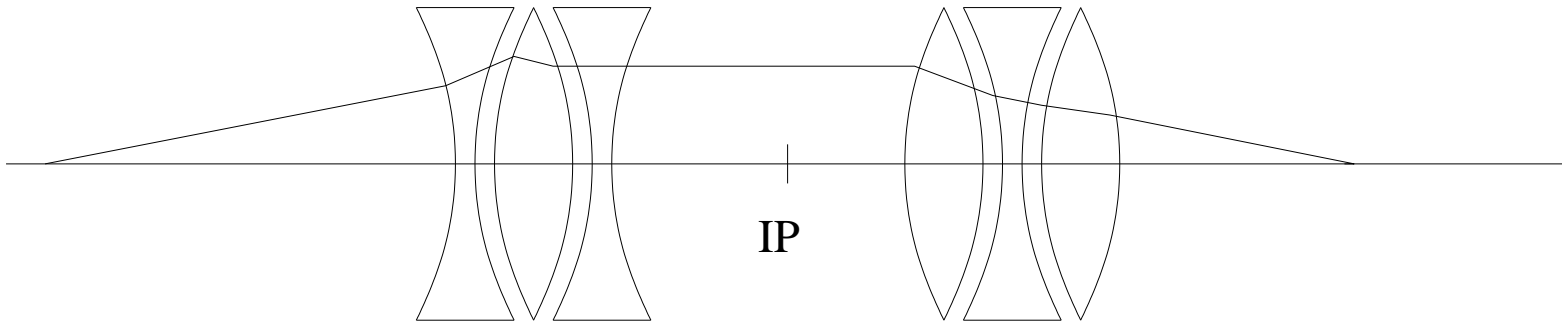
IR orbit feedback concept

The relative IP offset of the two beams is derived from the DX BPM signals as

$$\delta = \frac{BL + BR}{2} - \frac{YL + YR}{2}$$



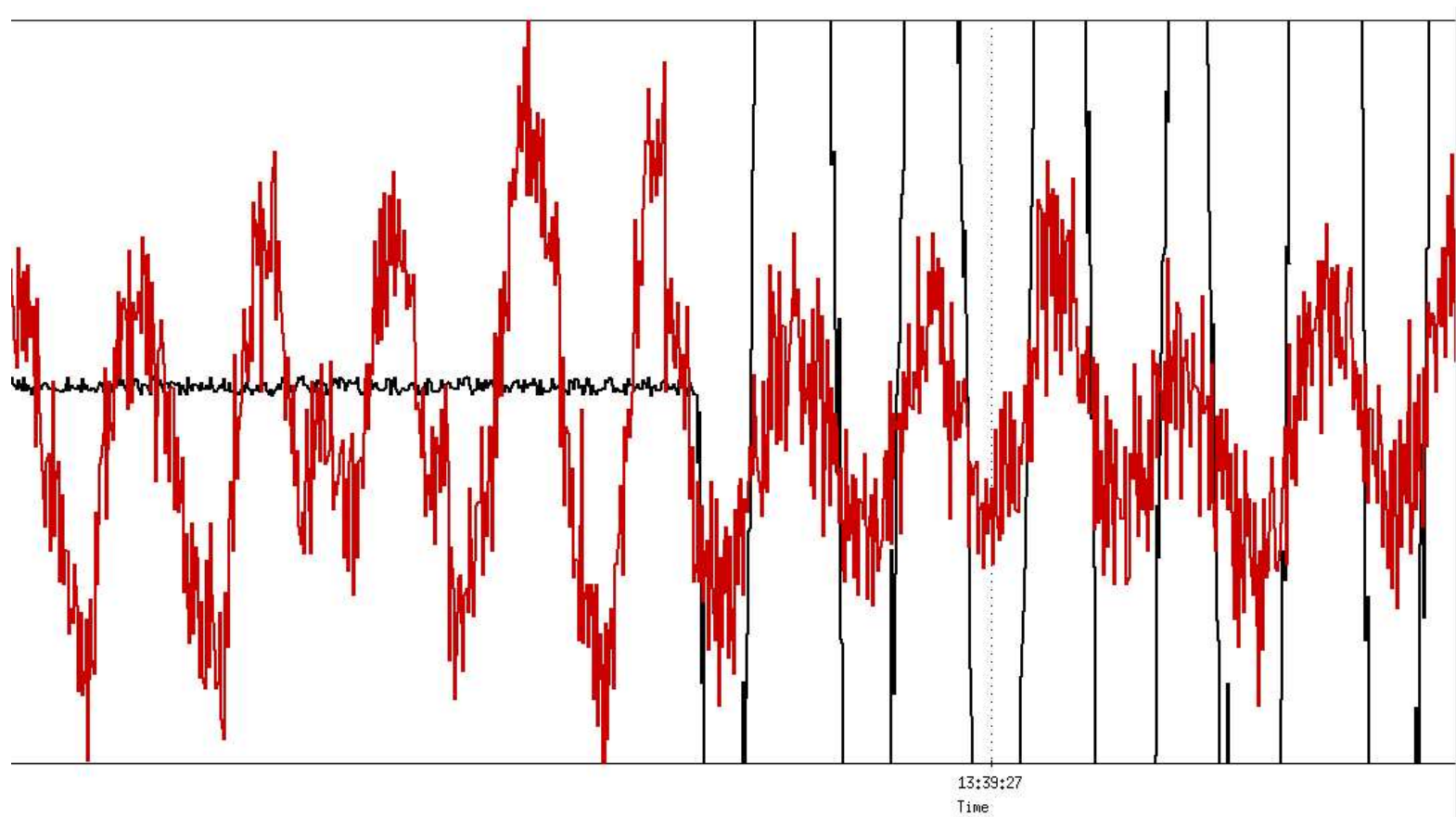
The IP offset signal δ is digitized, filtered and applied to a 2-bump across the IP, generated by warm correction coils in the BLUE ring.

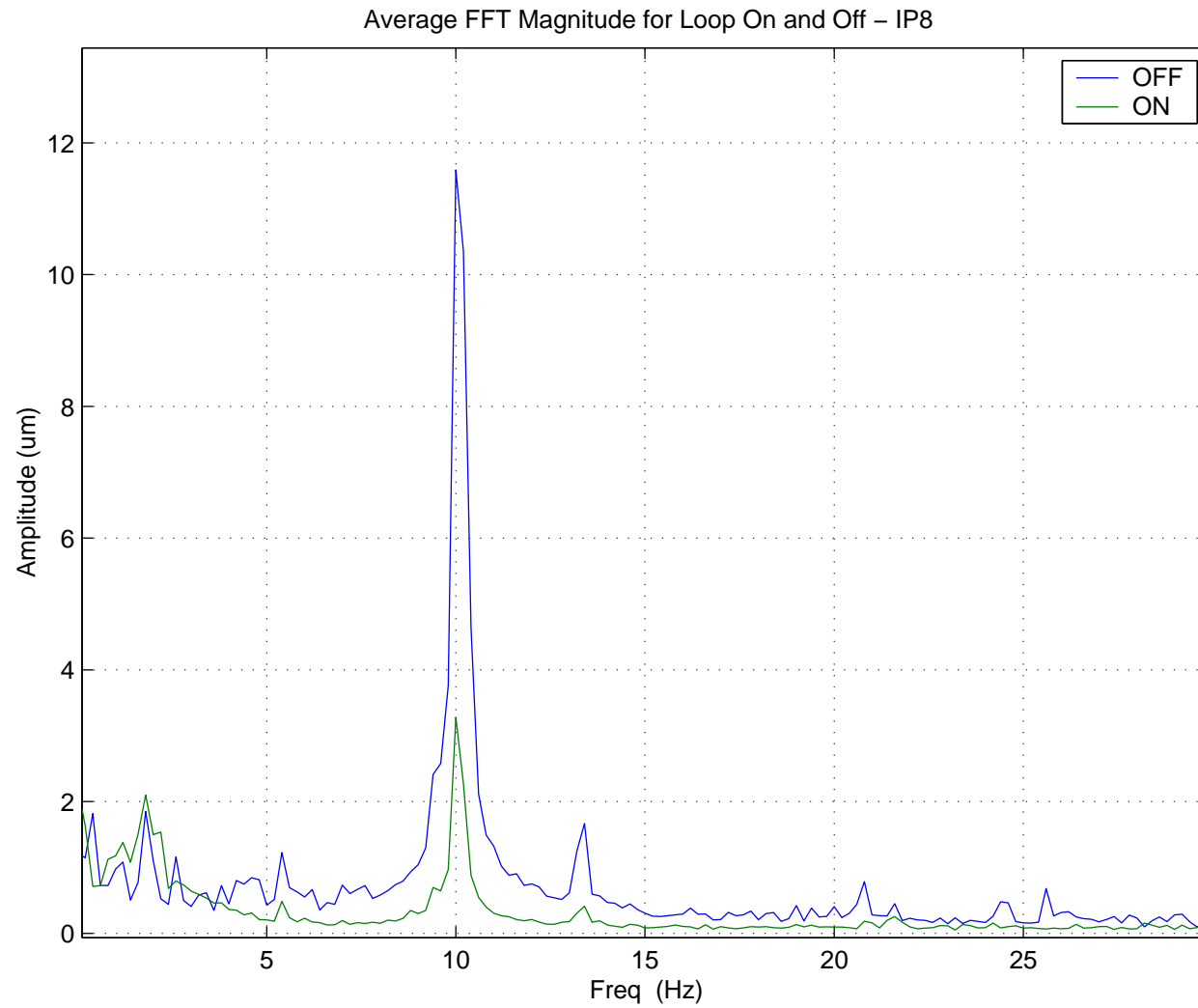


Warm correctors are installed in the focal points of the triplets.

Different kick angles are reflected in the number of turns, so magnets can be connected in series.

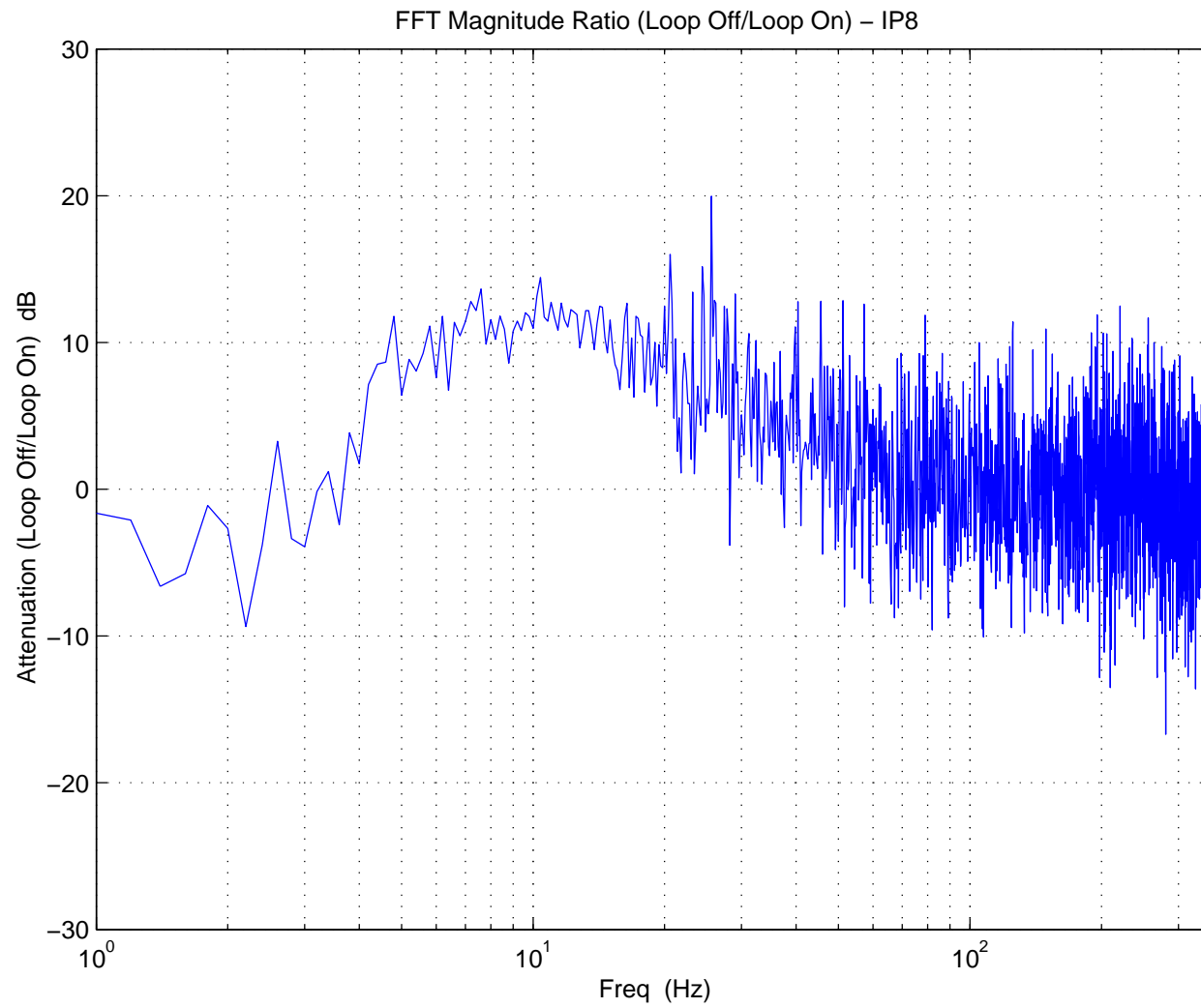
Measured IR orbit offset with feedback ON/OFF





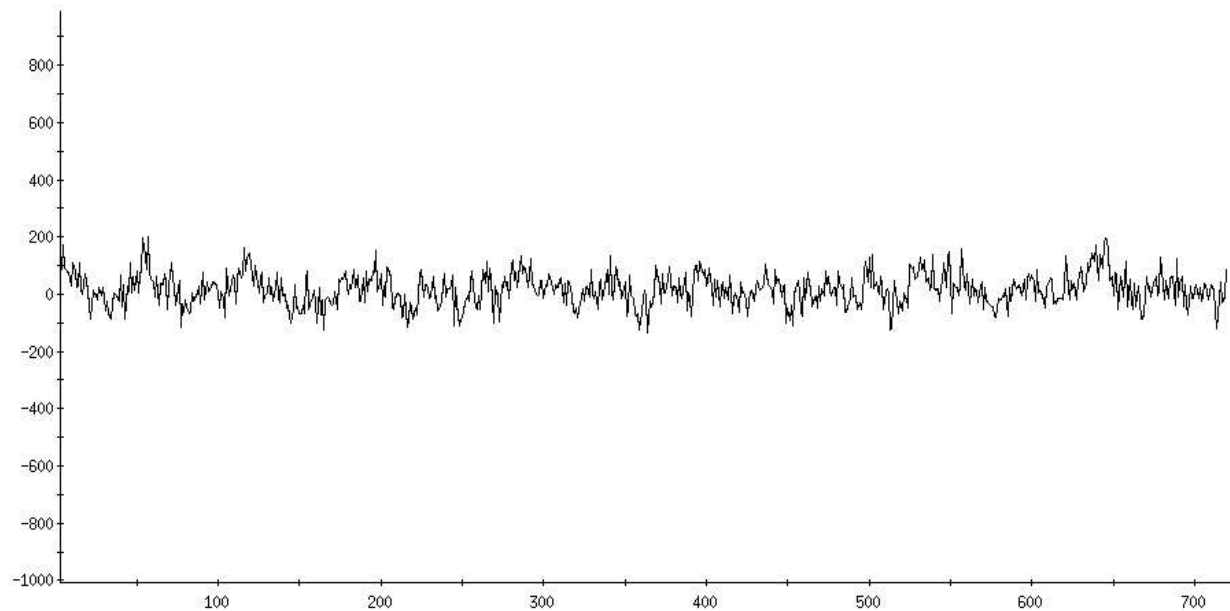
Factor > 3 (12 dB) attenuation at 10 Hz

Measured attenuation



Known limitations

Existing BPM electronics show “high” frequency noise.



This electronics noise is compensated by the IR feedback, moving the blue beam.

⇒ High frequency beam-beam offset is increased.

Planned improvements during Run-7

- New, commercially available BPM electronics (Bergoz) have been ordered that have superior signal-to-noise ratio.
- Based on these new electronics, a low-frequency IR orbit feedback system will be added to compensate slow drifts/oscillations (24 h orbit variation) up to ≈ 1 Hz.
- This slow feedback will also bring beams into collision at the beginning of the store – no more steering!

Conclusion

- Factor 3 attenuation at 10 Hz has been achieved
- Present system will be operational for FY07.
- New Bergoz BPM electronics have been ordered to overcome high-frequency noise problems.
- These new electronics will enable us to add low-frequency (“DC”) IR orbit feedback, which will also bring beams into collision based on BPM measurements.